Concluding Comments

As is demonstrated by the present volume, the information processing paradigm is a powerful method by which to elucidate and ameliorate cognitive deficits in a variety of disorders. Regarding the schizophrenias, the ability to identify such deficits appears to have outstripped the attempts to apply this knowledge to the treatment of these disorders. However, as the presence of certain cognitive deficits becomes more established in this area, researchers may direct their efforts more toward the treatment applications of this knowledge. Certainly the basic research identifying the deficits will remain the vital focus, yet given the information now available it appears that the time is right to apply this knowledge in a systematic manner to the treatment of cognitive processes in the schizophrenic disorders.

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Clinical Information Processing: Bias Inoculation

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Everyone makes numerous decisions daily. Frequently, these decisions are made without access to all of the potentially relevant information. Consequently, it is rare for any decision to be made without some degree of uncertainty. Many of these decisions are made in an automatic fashion, with minimal conscious processing and without serious consequences for the decision maker. This "automatic" decision making is efficient and appropriate for most everyday decisions (e.g., "What should I wear today?" "Should I order a steak and cheese grinder, a pepperoni pizza, or a gyro for lunch?") since the consequences of the decision are minor. Even when more is at stake, individuals rarely have adequate time to perform an exhaustive search and decision analysis. As Simon (1957) suggests, individuals tend to "satisfice" rather than "maximize." That is, individuals select an alternative decision that they believe to be at least adequate, if not necessarily optimal.

When using automatic modes of decision making, individuals rely upon a number of overlearned, cost-effective, inferential shortcuts or heuristics (Tversky & Kahneman, 1973). For example, they attend to salient features of a situation or individual, and they make decisions based on how representative a

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situation or person is believed to be of a general category (e.g., "He’s an ‘Archie-Bunker’ type, and thus he is likely to respond in ways that are similar to how I would expect Archie Bunker to respond in a similar situation"). Although these heuristics promote efficiency, they may contribute to less than optimal decisions.

Mental health professionals, by the nature of their work, are frequently required to make important decisions under conditions of uncertainty. Uncertainty arises from inevitable errors in observation or reporting; from variations in interpretation of the data, both between clinicians and within a single clinician over time; from the ambiguity of the language used to describe clinical findings and manifestations; from the probabilistic character of the relation between clinical information and presence of psychological distress in clients; and from changes in the clinical picture as the case unfolds, resulting from changes in the current state of knowledge and reliance on a priori theoretical orientations. Moreover, clinicians are largely dependent on the self-reports of their clients that are potentially biased, unwittingly or unwittingly.

Clinical judgment has traditionally been thought to be acquired chiefly through personal experience, observation, supervision, and conversation with peers and experienced practitioners. Most training programs do not favor systematic teaching of problem solving, inferential, and decision-making skills. This neglect is not confined only to the practice of clinical psychology. Medical educators have raised similar concerns about the training of physicians (e.g., Howe, Holmes, & Elstein, 1984).

Research on decision making under uncertainty reveals that errors of judgment are often systematic rather than random, reflecting biases inherent in our cognitive apparatus rather than mere confusion (Kahneman & Tversky, 1973). These errors of judgment are shared by laypeople and by experts whose livelihoods are based on their ability to make appropriate decisions, including stockbrokers (e.g., Stael von Holstein, 1972), electrical engineers (Kidd, 1970), intelligence analysts (R. V. Brown, Kahr, & Peterson, 1974; Janis & Mann, 1977), physicians (e.g., Elstein & Bordage, 1979; Zieve, 1966), and mental health professionals (e.g., Turk & Salovey, 1985). In the next section, we will briefly describe some of the sources of bias (for more extended discussions, see Kahneman, Slovic, & Tversky, 1982; Nisbett & Ross, 1980; Turk & Speers, 1983).

Common Sources of Bias in Clinical Judgment

Confirmatory Biases

Preexisting knowledge structures, or schemata, filter incoming stimuli prior to any decision-making process. That is, through training and the development of a theoretical orientation, organized sets of expectancies become a part of (and influence) every clinician’s decisional processes. These expectancies are necessary in order to sort out the plethora of information presented by clients and to make decisions reasonably quickly. They influence the types of questions that clinicians ask and the information encoded and later retrieved. However, these expectations, deriving from various theoretical orientations, can bias data-gathering processes, particularly when clinicians seek to confirm existing hypotheses (Bieri, Atkins, Briar, Leaman & Miller, 1966; Meehl, 1954; Mischel, 1968; Sarbin, Taft, & Bailey, 1960; M. Snyder, 1981b).

As classic research on implicit personality theory has demonstrated, initial conceptualizations of clients often developed rapidly from limited information (Asch, 1946; Bruner & Tagiuri, 1954; Meehl, 1960). The particularly pernicious aspect of this tendency is that once a judgment about a client has been made, it is subsequently used as a basis for later inferences about the person, independent of the information upon which the judgment was originally based. Moreover, these judgments show great tenacity (Carlston, 1977; Snell & Wyer, 1979). That is, once such a judgment has been made, it is typically adhered to vigorously, even in the presence of new, disconfirming information (L. Ross, et al., 1975; M. Rubin & Shontz, 1960). New data are often used to confirm existing hypotheses rather than to test alternatives or to generate competing formulations (see M. Snyder, 1981b). Meehl (1960) noted that clinicians form "images" of their clients within the first 4 hours of psychotherapy, and they staunchly adhere to these beliefs, expectancies, and hypotheses.

Clinicians often observe merely what they expect to observe. And since clinicians usually expect to observe pathology, they may report it even when there is little evidence on which to base such a conclusion (see Rosenhan, 1973; Turk & Salovey, in press). Such attempts to root out pathology from assessment protocols by experienced clinicians may explain the results of several studies reviewed by Mischel (1968) in which nonpsychologists and novices do as well, if not better, than experienced clinicians in their interpretation. Unfortunately, once labels are ascribed to a client they are "sticky," as Rosenhan (1973) has observed, and no matter how clients behave, they often cannot convince their therapists to change their initial assessments. The non-occurrence of deviant behavior after the initial labeling seems to be ignored.

Not only must clinicians be concerned with the influence of a priori hypotheses on the attention to and interpretation of data, but they should also be concerned about the impact of their behavior on the creation of confirming data, so-called self-fulfilling prophesies. That is, the behavior or questions asked by clinicians may elicit information from a client that will confirm prior expectations. For example, asking a client about his conflicts with his mother will elicit responses about such conflicts, and asking questions in an accusatory manner may elicit a hostile response from the client. In this way, the clinician may actually create the confirming evidence that he or she set out to find (see M. Snyder, 1981b; Turk & Salovey, 1985; Turk & Speers, 1983).
Anchoring and Adjustment

Anchoring, and subsequent failures in inferential adjustment, is a type of confirmatory bias whereby once a decision is made, subsequent information fails to modify expectations or appraisals to a sufficient degree (Nisbett & Ross, 1980). Initial estimates or predictions based on preliminary appraisals serve as the basis for subsequent judgments. Later appraisals and decisions are heavily influenced or "anchored" by the initial appraisal. This problem may occur even when we are aware of possible sources of bias in those initial decisions.

Some examples may serve to clarify the anchoring problem. Tversky and Kahneman (1974) provided subjects with an initial estimate of the number of African countries in the United Nations. Subjects were told that they could adjust this estimate if they thought it was inaccurate. If the initial estimate was stated as 10%, subjects adjusted it to 25%. But, if the initial estimate provided was "anchored" at 65%, subjects adjusted it to 45%. Thus, the difference in subjects' judgments, 25 versus 45%, was due entirely to the anchoring effect of the initial information with which subjects were presented. Once an initial judgment is "on the books," individuals are quite resistant to "further information, alternative modes of reasoning, or even evidential challenges" (Nisbett & Ross, 1980, p. 41).

Anchoring gives excessive weight to initial information that subsequently serves as the template against which newly acquired information is contrasted and weighed. Clinicians inference are frequently the result of an overreliance on information revealed about a client during the intake process, despite contradictory information gleaned later during the course of psychotherapy. In fact, the psychodynamic system can anchor therapists' future judgments: Once clients are diagnosed psychotic, it is difficult for them to ever be seen as normal. The diagnosis of psychosis serves to "anchor" all future judgments about them. Despite evidence to the contrary, judgments will prove biased in the direction of psychosis. Perhaps these processes account for the tendency to diagnose patients as "in remission" rather than as "recovered" or "normal" when they are released from mental hospitals (see Rosenhan, 1973).

The Availability Heuristic

Information that is easily "brought to mind," perhaps because it was perceptually salient or vivid, is said to be more "available." When individuals estimate the frequency or probability of an event or outcome by the case with which it is brought to mind, they are said to be employing the availability heuristic (Tversky & Kahneman, 1973). Unique cases of pathology, counterintuitive insights, and dramatic successes and failures are likely to be more available to the clinician than are routine examples of individuals dealing with more mundane problems, and so judgments are often unduly influenced by these memories. Freud treated a large number of patients, often as many as 10 a day during his practice. Yet he based much of his theorizing on a few rather vivid cases—a woman with a glove anesthesia, a man who dreamed of rats crawling into his anus—as opposed to the hosts of more routinely distressed (and thus less interesting and dramatic) individuals that he must have also treated.

As another example, we often overestimate the dangerousness of discharged mental patients because the occasional violent patient sticks in one's mind, with help from media coverage, while the more typical ex-patient who lives out a rather uneventful life is not as easily recalled. Since the dramatic, violent instances are more easily remembered, the clinician may judge a particular client as having a greatly inflated chance of being dangerous, ignoring base-rate data suggesting that discharged mental patients are rarely violent. This is a simple example of the lack of attention given to the non-occurrence of events which, from a probabilistic, Bayesian perspective, should be given equal weight. (We are reminded of Sherlock Holmes, in "The Case of Silver Blaze," observing that when the horse was stolen, the watch dog did not bark, indicating that the person who stole the horse was known to the dog. The non-occurrence of barking was the most significant fact.)

The Representativeness Heuristic

When clinicians must judge how likely it is an individual is a member of a particular category or how likely a given outcome can be explained by a particular set of antecedents, they frequently rely on a decision-making strategy called the representativeness heuristic (Kahneman & Tversky, 1972, 1973; Tversky & Kahneman, 1974). Representativeness refers to judgments based on the degree to which a given stimulus or evidentiary base matches the essential features of some schema (or a priori hypothesis). To make accurate decisions, one must consider the probability of encountering a category member as well as a non member by chance, given that they both exhibit some diagnostic sign. However, we often under utilize some of this important base-rate information and, instead, selectively attend to information that seems to fit a certain pre-existing set of expectations.

Contexts like the case conference often induce clinicians to make high base-rate statements about their clients or about their work, even though they think the issue is unique to their particular case. For example, at a recent case conference we attended, evidence was presented regarding an adolescent boy's concern about masturbation based solely on the results of a Draw-A-Person test, in which the boy drew a figure with hands behind the figure's back. Whether such an interpretation was based on an illusory correlation (described below) or was motivated by the clinician's desire to avoid possible errors and consequent ridicule by her peers is unclear, but it does seem to be a rather safe statement...
about adolescent boys—that they have some concerns regarding masturbation (see Meehl, 1973, for a detailed description of reasons why he no longer attends case conferences).

Clinicians tend to draw more confidence from a small body of consistent data than from a larger body of less consistent information. In the search for coherence, clinicians, like all individuals, often see patterns where none exist. They reinterpret data so as to increase the data’s apparent consistency and ignore or discount evidence that does not fit their expectancies. In this manner, clinicians are likely to overestimate the consistency of data and consequently be overconfident in their judgments based on such data.

**The Uniqueness or Preciousness Heuristic**

We might postulate an extension to the representativeness heuristic that is of particular concern for clinical practitioners called the uniqueness or preciousness heuristic, perhaps captured by the frequent statement made by clinicians: "We aren’t dealing with groups, we are dealing with the individual case!" (Meehl, 1973). The erroneous assumption here is that probability logic does not apply to the individual case. There seems to be a tendency to neglect distributional data and to rely mainly on single case information when the context increases the uniqueness of the problem or the individual. Although each client is unique in many characteristics, there is always some distributional information that should be considered. The relevance of distributional data can be masked by detailed acquaintance with the specific case or intense involvement as in psychotherapy.

In elementary courses in statistics, we all learned about normal distributions and the fact that large samples are likely to be more representative of the population studied. As a corollary, we should also have learned that small samples are more likely to deviate from the general class than large samples. Tversky and Kahneman (1971) noted that individuals seem to be unaware of this fact and believe that small samples are likely to be equally representative of the larger population. When clinicians interview clients or administer specific assessment instruments, they observe a small sample of the client’s behavior and tend to assume that this sample is representative of the client’s general population of behaviors.

This problem is what some have viewed as the "sign" versus the "sample" approach to the assessment of individuals (J. W. Wiggins, 1973). The client’s behavior is viewed as a sign of some inherent characteristic (e.g., trait, need, conflictual area), and the observed behavior is thought to correspond directly to this underlying feature. The sample approach assumes that any observation about a client is merely a sample of his or her behavior, which does not necessarily relate to underlying personality characteristics. Clinicians must acknowledge that they only have access to a small fragment of potential information about their clients. We cannot be sure that what we have observed is a reliable sample of some general mode of responding, uninfluenced by the social context where the behavior was sampled. For example, how diagnostic would it be to learn from our client that in church he tends to be quiet and reserved or at a football game verbalizes passionately? Clinicians need to consider the reliability of any small sample of behaviors and to be cautious about making predictions based on potentially unreliable evidence.

Additionally, statistical regression is often ignored. That is, the more extreme an individual’s behavior, the more likely it will ultimately be followed by behavior that is more typical or "average." Predictions based on extreme behaviors are likely to be erroneous. Regression effects may account for the observation that many clients drop out of treatment or do not come for initially scheduled interviews. It is quite possible that self-referrals are more frequent when situations and symptoms seem more severe. When examined at another point in time, the same situation might be evaluated quite differently.

**Illusory Correlation**

Another source of error in decision making derives from difficulties that individuals have with intuitively correlated events: They tend to perceive associations between events even when they are aware that the relation between the events is incidental (Tversky & Kahneman, 1980). For example, the Chapmans have noted in their research on this problem (Chapman, 1967; Chapman & Chapman, 1967, 1969) that certain kinds of patient responses on projective tests lead clinicians to make specific psychopathological diagnoses (e.g., distorted eyes on a Draw-A-Person test represent clinical suspicions and paranoia; a male patient seeing buttocks in Rorschach inkblots indicates homosexuality; or as noted earlier, creating a Draw-A-Person picture with hands behind the back is associated with masturbation) even though there is no objective evidence (i.e., validity studies) to support such relationships.

When presented with evidence to the contrary, clinicians in these studies showed remarkable consensus in believing that certain projective test percepts were clear diagnostic signs, even though no verifiable association between the responses and the particular diagnosis actually exists (see L. Ross et al., 1975, for a demonstration of the perserverance of beliefs even in the light of direct information to the contrary). This is not to suggest that clinicians cannot correctly observe covariation or use situational information appropriately. Rather, it suggests that when information is ambiguous, belief about covariation may influence the perception of covariation even when such associations are invalid (see Alloy & Tabachnick, 1984; R. S. Lazarus, 1966).
Debiasing the Clinician

The many potential sources of errors and biases in decision making have been detailed at length by Nisbett and Ross (1980), Meehl (1973) and in a book edited by Kahneman et al. (1982). After exploring the range of biases produced by the basic mechanism of information processing, you may feel that the situation is hopeless. You may be demoralized and immobilized, suffering from “learned helplessness,” like M. E. P. Seligman’s (1975) dogs who discover that there is little they can do to influence outcomes. You may feel like the clinician in Fig. 1.

Some of you may feel that we are about to do yet another “hatchet job” on clinical practitioners, describing in even more detail their ineptitude. You may easily call to mind the acrimonious debates that followed the publication of Meehl’s treatise on clinical versus actuarial prediction (see Holt, 1970; Meehl, 1954, 1960).

We urge you to take heart and read on. It is not our intention to denigrate practitioners. The remainder of this chapter is concerned with strategies to combat bias and improve upon clinical decision making. Experience has taught us that it is insufficient to simply point out potential problems without suggesting some alternatives. The behaviorists have sensitized us to this problem with their concern about the merit of insight without corresponding behavioral change.

To change behavior, one needs to have knowledge (insight) of both problems and alternative strategies (skills), as well as some degree of confidence in one’s ability to make use of these skills. We are not suggesting that all of the potential sources of bias are always detrimental. Obviously they have some survival value. Nor are we suggesting that one can ever eliminate them. Rather, we are concerned with strategies that might be utilized to circumvent some of the most troubling information processing errors. We will consider the range of alternatives (strategies) available to “inoculate” the clinician against some of the most persistent and detrimental sources of error in decision making.

The potential for biases to influence judgment is not a particularly novel idea. Philosophers, scientists, clinicians, and mystery writers alike have noted the problem. Even Freud (cited in Malcolm, 1983) was aware of the potential for biases to influence the nature of therapy (and consequently his theory). In describing his seduction theory (wish fulfillment and the nature of the Oedipal complex), he noted:

When, I was at last obliged to recognize that the scenes of seduction had never taken place, and that they were only fantasies which my patients had made up or which I myself had perhaps forced on them [emphasis added], I was for some time completely at a loss. My confidence alike in my technique and its results suffered a severe blow; it could not be disputed that I had arrived at these scenes by a technical method which I considered correct. (p. 103)
FIG. 1. The perplexed clinician contemplating what to ask his new client. He must consider the following possibilities:

A. My a priori theories and stereotypes might influence what questions I ask.

B. The answers to the questions that I ask may be distorted to fit my theoretical orientation.

C. I may selectively recall information to confirm my initial hypotheses.

D. My own mood may influence what questions I ask.

E. My initial hypotheses may lead me to differentially weigh some information and discount other information.

F. Salient characteristics of the client and information provided may be more accessible.

G. I may be projecting my own conflicts and needs on to the client.

H. The questions that I ask may influence the type of information that I obtain.

I. My interpersonal style may influence her responses.

J. I may inadvertently be selectively reinforcing her provision of some information and the withholding of other material.

K. My initial predictions about the client may serve to anchor subsequent predictions making them too liberal or too conservative.

L. The client's gender may influence the questions that I ask, my interpretations of her responses, and the nature of my predictions.

M. The client's age may influence the questions that I ask, my interpretations of her responses, and the nature of my predictions.

N. The client's socioeconomic status may influence the questions that I ask, my interpretations of her responses, and the nature of my predictions.

O. The client's religion may influence the questions that I ask, my interpretations of her responses, and the nature of my predictions.

P. The client's physical appearance may influence the questions that I ask, my interpretations of her responses, and the nature of my predictions.

Q. The client reminds me of "Edith Bunker," and this fact may influence my expectancies.

R. My behavior may be influenced by what she tells me.

S. Since any question that I ask will provide some confirmatory evidence, I can never acquire disconfirming evidence for any hypothesis.

T. Once diagnosed, the client may act to confirm my initial formulation.

U. I may selectively recall salient information or characteristics.

V. I may selectively recall information to confirm my stereotype.

W. I may interpret her responses as supporting a particular hypothesis, but this may be the result of an illusory correlation.

X. My own mood may affect what I remember about the client.

Y. I may be ignoring bases rates or be unaware of the appropriate bases rates to employ!

Z. I wonder if it is too late to become an accountant or perhaps to rejoin my old jazz band?
decision makers can generate alternatives and evaluate these, they are less likely to attend to exclusively confirmatory evidence. This view is consistent with the Kuhnian notion that theories in science are not discarded, despite evidence to the contrary, they are just replaced by better alternatives (Kuhn, 1962).

Asking questions that falsify one hypothesis while confirming a second is perhaps the ideal strategy. Einhorn and Hogarth (1982) describe decision making as replacement. Decision makers are more likely to give up erroneous theories if they can replace them with alternative ones. Explicit specification of alternatives should make these more "available" and consequently more capable of being tested, confirmed, and falsified. If the decision does not have an available alternative, clinicians may be biased to accept the existing hypothesis. The availability of no hypothesis may be anxiety arousing (Einhorn & Hogarth, 1983; J. C. Wright & Murphy, 1984).

It is important that decision makers generate plausible scenarios that are capable of explaining the observed evidence. They should consider not only "what is" but "what might have been." In addition, more attention needs to be paid to situational factors that might have influenced the observed behavior; the behavior may not be an inherent characteristic of the client. Thus, the ability of clinicians to use their imagination becomes critical to accurate decision making. Strict adherence to a theoretical perspective without ability to generate alternatives will likely lead to biased decisions. Thus, decision makers need to consider not only how the evidence fits one specific hypothesis, but how it fits or fails to fit competing hypotheses. If clinicians can generate competing, mutually exclusive hypotheses, they can ask questions that at the same time provide evidence to support one hypothesis while disconfirming a second.

Nisbett, Ross, and their colleagues (Nisbett & Ross, 1980; Nisbett, Krantz, Jepson, & Kunda, 1983) also emphasize the importance of deautomatizing decision making. They suggest that a set of maxims may be valuable in combating the biases effects of both theories and "heuristics" (e.g., "You can always explain away the exceptions" or "What about the other three cells?").

Nisbett et al. (1983) also suggest that the combination of these statistical rules or maxims and formal training in the use of statistical procedures should be employed to increase the likelihood that individuals will come to less biased decisions. However, Tversky and Kahneman (1980) report that even those who are trained in decisional sciences are prone to many of the same errors as those who have not received such training. Mahoney (1976) demonstrated that even scientists trained in the scientific method and in statistics resorted to heuristics and confirmatory biases when they moved beyond their own area of expertise. The problem here may be the style rather than the content of the training that is provided. Abstract presentation of didactic information with little opportunity for direct exposure to the experience of making errors and assessment of this process would not be likely to generalize beyond the classroom.

Generating competing hypotheses and scenarios is important, but clinicians also need to consider feedback as to their own successes and failures in utilizing information to make predictions. We are reminded of Theodor Reik’s 1948 book Listening with the Third Ear, in which he described what appears to be an amazing, intuitive insight into the hidden meaning of his client’s statement that one of Reich’s book was upside-down on the bookshelf, “revealing” that she had an abortion. But we are not told of the number of his incorrect interpretations. It is all too easy to recall dramatic successes and to disregard those instances in which we made an erroneous conclusion or decision.

A cautionary note: Feedback is not necessarily corrective. It can be ambiguous, misleading, and difficult to discern. Keeping a log or diary of the outcomes of specific decisions would be useful in identifying the nature of successes and failures, and these could be carefully examined to identify what factors might have contributed to the adequacy of decisions and predictions.

Clinicians should consider the utility of developing algorithms to assist in clinical decision making as analogous to those used in medical decision making (e.g., Zarin & Pauker, 1984) and described in the third edition of the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 1980). For example, if the options for available treatment are group versus individual, what types of questions would be employed to assist in the decision, with certain client responses leading to one type of question and other responses leading to a different set of questions?

A particular strategy that may be relevant in light of the preceding paragraph was articulated by Benjamin Franklin (quoted in Dawes & Corrigan, 1974, p. 95):

"I cannot for want of sufficient premises advise you what to determine, but if you please I will tell you how. My way is to divide half a sheet of paper by a line into two columns; writing over the one Pro and the other Con, then . . . I put down under the different heads short hints of the different motives, that at different times occur to me for or against the measure. When I have them all together in one view, I endeavor to estimate the respective weights, to find at length where the balance lies."

Janis and Mann (1977) describe what appears to be an analogous procedure, called the balance sheet, for assistance in decision making. What Franklin and Janis and Mann are suggesting is that the process of listing and evaluating the evidence, both for and against a hypothesis, assists the decision maker by focusing his or her attention on each side or competing hypotheses.

Bias inoculation

Our discussion to this point has focused upon the information available regarding factors that might improve decision making—the "what" of debiasing
but not the "how." Simply reading information of the type that we have been reviewing is not likely to lead to behavioral change (Bandura, 1977b). How can we "inoculate" clinical decision makers so that they make less biased decisions?

Let us first note what we mean by bias inoculation. We are using the term inoculation in a similar way as it is used in medicine and, more recently, in relation to stress (Meichenbaum & Cameron, 1983; Meichenbaum & Novaco, 1976; Meichenbaum & Turk, 1976). Inoculation implies that the individual is "injected" with a small quantity of a virus in order to build up an immunity. In the case of bias inoculation, we would propose subjecting individuals to small doses of information and actual experience where they have opportunities to make a range of errors with subsequent opportunities for case analyses and feedback. This procedure will assist in inoculating them against these "pathogens" in subsequent situations. Note that inoculation implies direct exposure and not simply receipt of didactic information. Here we are making a distinction between what may be viewed as a knowledge and skill deficiencies (inadequate information) from production deficiencies (failures to implement appropriate skills or bring relevant knowledge to bear when appropriate for the situation at hand).

Bandura (1977b) has suggested that behavior change can be brought about in four different ways, namely, verbal persuasion, vicarious experience, emotional arousal, and performance accomplishments. Although he was specifically referring to how psychotherapies bring about changes in perceptions of self-efficacy, we believe that the sources of information that he outlined may be as relevant for assisting in short-circuiting the impact of some of the potential sources of error in decision making or what we think of as bias inoculation. We would expect that all four sources of information are important for the production of behavior change, especially actual performance.

Borrowing from Bandura's (1977b) conception of efficacy expectations, we can distinguish between outcome efficacy, or the belief that information and training are likely to lead to desirable results, and self-efficacy, the belief held by the individual that he or she can actually perform the task at a sufficient level of proficiency. To illustrate, clinical psychologists may, after reading about Bayes' theorem (suggesting that base-rate information needs to be attended to), conclude that using this device should improve decision making (outcome efficacy). Yet, the psychologists may not believe that they have the ability to calculate all of the components of the theorem (i.e., base rates, prior odds, likelihood ratio), and, thus, they would be said to have low senses of self-efficacy. Both types of efficacy expectations seem to be necessary for confident, reliable behavior (Bandura & Cervone, 1983; Barrios & Nichaus, 1984; Condie & Lichtenstein, 1981).

15. Bias Inoculation

The distinction between outcome efficacy and self-efficacy might be viewed here as a distinction between the information and skills necessary for clinicians to possess and how this information should be provided so that it is most likely to be accessed in specific situations. That is, we believe that it is necessary to provide students or clinicians with certain types of information, but this is not sufficient to guarantee its use. In addition to merely providing information, it is important to consider how it should be presented for maximal impact on behavior. Didactic presentation or verbal persuasion may be sufficient to produce high levels of outcome efficacy, but they will not lead to enhanced self-efficacy.

Most of us tend to believe that we are not prone to many of the errors described above, disregarding Fischhoff's (1975) argument that hindsight is not equal to foresight. We can look back upon another person's decision, given knowledge of its outcome, and believe that we would never have made these errors.

Metacognition

Shiffrin and Schneider (1977) have made a distinction between automatic and controlled information processing. Automatic processing is conceptualized as being routine, requiring minimal conscious attention, whereas controlled processing requires conscious awareness of cognitive activities. Novices in many areas begin with controlled processing, and as they become more expert, it becomes more automatic. The same processes may characterize clinical practice and may explain why the evidence does not support any decisional advantage of clinicians with greater number of years of experience (Crow, 1957; L. R. Goldberg, 1959). What seems important, then, is for decision makers, especially in ambiguous situations, to engage in more controlled processing and greater self-interrogation. There is a need to balance concerns about premature closure with those of problems of collecting highly redundant information that may rigidify our expectations.

An important concept that will characterize all of our suggestions for debiasing and bias inoculation is that of metacognition. According to Flavell (1979), metacognition is the awareness and monitoring of one's own cognitive processing, including memory, comprehension, knowledge, goals, and, in general, cognitive resources. Flavell has outlined three components of metacognitive inquiry that are of clinical importance. Person variables include facets of social understanding such as self-perception, self-monitoring, and, in general, what individuals know regarding themselves and others as cognitive processors. Task variables include the awareness of what cognitive resources (quantity and quality of information) can be applied to the solving of various problems. Finally, the monitoring to strategies includes the awareness of how one determines a path of
action toward the accomplishment of a goal. Clinical decision makers need to attend to these components of metacognition and to become aware of their knowledge bases, attending to what they know and do not know. One way to foster this self-knowledge is to teach clinicians how to engage in appropriate self-interrogation.

It is useful to ask decision makers to identify counterarguments so that both sides of the issue can be considered. For example, we would encourage clinicians to pose to themselves such questions as “What are my hypotheses about this client and the causes of the presenting problem?” “What competing hypotheses might explain the data?” “What data would be required to falsify my initial hypotheses while providing some support for an alternative?” “What information was not present that if my hypothesis was true I would have expected?” Explicitly describing our thinking may alert us to errors and biases in our formulations and conclusions.

Self-interrogation and “thinking aloud” are important debiasing strategies as they serve to deautomatize our decisional processes and permit us to become more aware of our own thinking. In working with students, it may be helpful to provide tasks where they are asked to write up their intake cases from a theoretical perspective different from their own. This procedure will induce students to attend to alternative ways of interpreting data. Students could also role-play convincing someone else of the problems related to sources of bias and thereby generate persuasive arguments on their own.

Students and novices learn a great deal about clinical practice from their supervisors. A potentially useful strategy to employ is to have supervisors model their decision making. Bandura (1977b) has suggested that modeling is one of the ways in which people learn new behaviors. Supervisors thinking aloud about specific cases and formulations as well as predictions may serve as an important vehicle to encourage fledgling clinicians to engage in similar processes. Tapes of expert clinicians and decision makers might also be developed to illustrate the merit of self-interrogation.

Discussions and Socratic dialogues would appear to be additional strategies of some potential in clinical training. Didactic instruction and presentation are important strategies for conveying information, but verbal persuasion is less likely to lead to behavior change. Within this discussion, the applicability of the body of literature to clinical situations and cases can be raised. Examination of the biases of clients can serve to illustrate how these sources of error may inhibit optimal decisions and behavior. It seems more palatable to identify the errors in others than in ourselves.

Yet, regardless of how well didactic material is presented, decisions makers must acknowledge the importance of this information. Moreover, they must believe that knowledge of such information can inhibit the production of some of the major errors. Demonstrating how the awareness of biases and decision rules can prevent erroneous conclusions is especially important in enhancing outcome efficacy. Clinicians need to see that there are potential remedies for reducing errors, if not totally eliminating them. This insight is necessary, but not sufficient, to ensure that clinicians attend to biases in their clinical work.

Summary and Conclusions

We divided our chapter into two major sections. In the first, we discussed some of the limitations on human information processing and described how these can result in biases in clinical inference and judgment. In the second section, we reviewed the nascent literature on debiasing and outlined ways in which clinicians might avoid or reduce some of the judgmental pitfalls. In this manner, we attempted to inoculate the reader against some of the most common inferential traps.

Unlike other papers that have appeared on clinical judgment, we have not set out to demonstrate that clinicians are particularly poor at making decisions (see, e.g., Mischel, 1968 chap. 5). Rather we sought to convey the fact that clinicians, in common with laypeople, possess cognitive systems that foster the use of specific processing heuristics that may serve them well most of the time but may contribute to less than optimal decision making. Like bartenders, hairdressers, and cab drivers, clinicians develop and maintain cognitive representations (i.e., schemas, stereotypes, theoretical orientations) that filter the information that is observed and guide what is recalled. Moreover, these cognitive representations can influence our weighting of information and even affect our behavior so that we elicit hypothesis-consistent information. The main message of the first section of this chapter, then, is that our clinical training does not make us immune to biased and heuristically driven processing.

Rather, what our clinical training does lead to is overconfidence in our clinical judgment. Although we are well aware that computers rigidly adhering to a particular decision rule are better at common "clinical" judgment tasks (e.g., selecting students for graduate school, deciding whether to release a hospitalized mental patient) than are clinicians (see Meehl, 1954; Sawyer, 1966; J. S. Wiggins, 1973), we still insist that such "mechanical" procedures must be subject to error because they fail to consider unique characteristics of a client or exceptional cases. The fact, however, is that they are not; but we are (L. R. Goldberg, 1968; Kahneman & Tversky, 1979). As Kahneman and Tversky (1979) note, "A fallible predictor can retain a chance to correctly predict a few exceptional outcomes only at the cost of erroneously identifying many other cases as exceptional" (p. 321).

Why do we tend to be poorer judges than we think? We tend to

1. overemphasize preexisting theories and expectations in deciding what evidence is relevant and how to interpret such evidence;
(2) be unaware of biases due to limited sample size and typicality (representativeness of our sample);
(3) underutilize base-rate (distributional, prior probability) information;
(4) not recognize the predictive limitations of extreme values (regression effects);
(5) overestimate the degree of relationship between two "intuitively" related variables (illusory correlation);
(6) place excessive emphasis on preceptually salient information (availability heuristic);
(7) be overinfluenced by the context in which clinical work is practiced; contexts that reinforce the sanctity (or preciousness) of the individual and ignore information about distributional information and other "group" characteristics;
(8) be reinforced for identifying pathology and punished for reporting thoughts, feelings, and behavior that are "within normal limits";
(9) fail to attend to our unsuccessful predictions as well as our successful ones (how well calibrated we are).

In the second section of this chapter, we attempted to demonstrate that although most of these sources of bias derive from limitations of our information processing system, by awareness of these, attention to our own cognitive processes, careful self-interrogation, generation of competing hypotheses, and record keeping to provide feedback, we can inoculate ourselves against some of the more flagrant errors.

Thirty years ago (Meehl, 1954) correctly noted that psychologists should be sophisticated about errors of observing, recording, retaining, and recalling to which the human brain is subject. We, all people, ought to be highly suspicious of ourselves. We have no right to assume that entering the clinic has resulted in some miraculous mutation and made us singularly free from ordinary errors. (pp. 27–28)

It is important to emphasize that the suggestions we made for debiasing are based largely on intuition and a only a small degree on research data. Can clinicians become less error-prone? and How? are two questions that remain open to investigation. The merit of our chapter will have to be appraised on the basis of the extent to which we have sensitized readers to the potential sources of problems and potential solutions and thereby modified the behavior of practicing clinicians, those engaged in the training of clinical students, as well as graduate students who will become leaders in the field. Moreover, if we have served to stimulate research on debiasing, then we have especially succeeded in our mission. An important caveat that we can offer in closing was noted by Barbara Tuchman (1984) in her treatise on folly: [The] tragic side of folly [is] that its perpetrators sometimes realize that they are engaged in it and cannot break the pattern" (p. 24).
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